Where chemistry helps
The Institute of Advanced Chemistry of Catalonia (IQAC) “Where Chemistry Helps!!” is located in the technological and scientific campus of Pedralbes near the Parc Científic de Barcelona and several departments of the Polytechnic University of Catalonia and the University of Barcelona.

The IQAC carries out research of excellence in Chemical Sciences to address and solve problems of socio-economic relevance, mainly those related to human health, the sustainability of chemical processes and products, and the needs for novel materials for different applications.

The research developed at IQAC is organized around two main nodes: Biological Chemistry and Surfactants and Nanotechnology and it is facilitated by a number of Key Enabling Technologies. By the objectives pursued, many of the investigations performed by the Research Groups lie at the intersection between nodes.

The Biological Chemistry node carries out fundamental and applied chemical research involving the development of cutting edge chemical methods and the application of innovative chemical approaches to investigate biological processes.

The Surfactants and Nanotechnology node carries out fundamental and applied chemical research, involving innovative surfactants, nanostructures and devices at the nanoscale.

Our research goal is the improvement of the quality of life through the understanding of the molecular mechanisms and the sustainability of chemical processes.

Key Enabling Technologies to achieve the research objectives

- Theoretical and Computational Chemistry
- Statistical Modeling
- Chemical Synthesis
- Biological Assays
- Physical Chemistry Techniques
- Biotechnology
- Formulation science and technology
This node carries multidisciplinary studies using different molecular entities and chemical approaches to use, understand or act upon biologically relevant biomolecules and processes with the aim of advancing in knowledge, as well as of developing diagnostic and therapeutic strategies to fight human diseases.

Studies include the molecular design and synthesis of chemicals of different nature and the study of their properties and biological activities, which encompass from chemical and biochemical determinations to experiments in cultured cells and small rodents.

Molecular entities and applications include:

- New nucleic acid derivatives to control gene expression.
- Antibodies against small molecules to develop new biosensors for diagnostic and health safety applications.
- Peptides for the development of novel biosensors for the diagnosis of human diseases and the discovery of therapeutic agents of peptide origin.
- Nutraceuticals as disease-preventing agents.
- (Glyco)lipid metabolic pathways and cell signaling cascades, and molecular mechanisms involved in the biological functions of (glyco)lipids and lipidated proteins as source of diagnostic and therapeutic agents.
- Small chemical entities to interfere with therapeutically relevant biological processes. The path to discovery is either via rational/in silico design or library screening using in-home developed high throughput assays.
- Supramolecular constructs as new receptors for the molecular recognition of ions and molecules of biological interest.
- Biocatalysts for the obtaining of molecules of interest in different fields. Modification by means of computational design and genetic engineering provides a toolbox of enzymes with a la carte activities and selectivities.
- Generation and application of plasma products in medicine, agriculture and food.
OUR ACTIVITY

SURFACTANTS AND NANOTECHNOLOGY NODE

Research is focused on fundamental and applied chemical investigation of surfactants, (macro) biomolecules (oligonucleotides, antibodies), self-organized supramolecular colloidal systems and other nanostructured materials and devices at the nanoscale.

Non-thermal plasmas (low and atmospheric pressure) are used for surface functionalization (tailoring of adhesion and wetting properties) or polymerization initiation.

Specific topics covered include:

- Fundamental and applied chemical investigation of novel environmentally friendly surfactants and ionic liquids from natural renewable sources to be applied in different industrial fields. Studies include the preparation of new surfactants, their physicochemical and biological characterization and the investigation of their fate and effects on the aquatic environment.

- Development of self-assembled lipid structures (liposomes, micelles, bicelles and bilayers), their physicochemical characterization and use for various industrial applications, including the delivery of active compounds both systemic and topical (formulations and biofunctional textiles).

- Study of surfactant aggregates (micelles, liquid crystals, vesicles) and colloidal dispersions (microemulsions, nano-emulsions, etc.) for the development of nanotechnological applications (nanoreactors for the preparation of novel nanostructured materials and controlled drug delivery systems).

- Development of immunosensors based on the integration of specific antibodies on particular microelectronic or nanostructured transducers and devices as novel molecular diagnostic tools.

- Formation and characterization of structured materials and their applications in novel technological processes. This includes surface modification and characterization of materials and hydrogels, development of stimuli-responsive textiles, and preparation and characterization of organic and inorganic porous materials.
IQAC RESEARCH FACILITIES

- Synthesis of High Added Value Molecules
- Custom Antibody Service
- Nuclear Magnetic Resonance
- Electron Paramagnetic Resonance
- Infrared and UV-visible Spectroscopy
- SAXS/WAXS
- Characterization of Colloidal Dispersions
- Microanalysis
- Thermal Analysis and Calorimetry
- Cell Culture
- Non-Invasive Bioluminiscence Imaging
- Biodegradation and Aquatic Toxicity
- Dermocosmetic Assessment
- Omics (Metabolomics, Lipidomics and Proteomics) and MS-Imaging

SEDQ
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En SEDQ creemos en un modelo de agricultura eficiente y sostenible. Fruto de esta creencia y de 25 años de investigación y desarrollo, hemos reunido un completo catálogo de feromonas y atrayentes eficaces para el control biológico de plagas.

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